Adaptive Support Ventilation Reduces The Number of Ventilator Changes From Initiation To Liberation

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Adaptive Support Ventilation Reduces The Number of Ventilator Changes From Initiation To Liberation

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Background:

- Goals of Mechanical Ventilation:
  - Optimize gas exchange
  - Decrease work of breathing
  - Minimize ventilator induced trauma
  - Maximize patient-ventilator synchronization
  - Facilitate liberation

Adaptive Support Ventilation (ASV):

- ASV is a closed loop mode of ventilation designed to maintain goal-directed mechanical ventilation using a lung protective strategy.
- ASV streamlines the set-up and weaning of the mechanical ventilation patient.
- Ventilation targets are derived from analysis of the patients pulmonary mechanics and are automatically implemented.
- All time-cycled delivered breaths are pressure regulated volume targeted breaths. **(PRVC)**
  - Spontaneous breaths are delivered with pressure support targeted at a desired tidal volume.
- **Ventilator parameters:** tidal volume/respiratory rate are set based on Otis' least work physiology.

For any combination of resistance, compliance, V'a and Vd, there is a respiratory rate where WOB is minimal

Otis Least Work of Breathing

$$f\text{-target} = \sqrt{\frac{1+2*RCexp*(MV-V'D)/VD-1}{a*RCexp}}$$

Otis AB, Fenn WO, Rahn H, Mechanics of breathing in man, JAP 1950; 2: 592-607

Methods:

- We conducted a retrospective cohort study in our SICU on abdominal/thoracic patient populations who had achieved pulmonary stability.
- We compared one hundred patients ventilated via ASV mode to one hundred similar historical cohorts ventilated via CMV/SIMV modes.
- Cohorts were matched by: age, BMI, ventilator duration, and surgical diagnosis.
- We assessed ventilator interactions over an eighteen month time frame.
- An interaction was defined as: a mode change, rate/tidal volume adjustment, PSV titration, and %minute ventilation adjustment.

Results:

Table 1. Title

	Interventions	Age	BMI	Abd Surg	VLS	Thoracic
ASV	3.4	62.6	32.1	72%	5.1 days	28%
Cohort	6.2	63.8	29.9	69.6%	5.6 days	30.4%

Discussion:

- The number of ventilator interactions was less in the ASV group compared to the CMV/SIMV cohort group.
- ASV had 3.4 ventilator interactions compared to 6.2 for the CMV/SIMV cohort group.
- Ventilatory duration was 5.1 days in the ASV group compared to 5.6 days in the CMV/SIMV group.

Conclusion:

- ASV resulted in a reduction in both the number of ventilator interactions and ventilatory duration
- ASV may optimize patient comfort by transitioning from time-cycled to flow-cycled ventilation when workloads prevent timely ventilator adjustments
- Transitioning to flow-cycle ventilation may help facilitate ventilatory liberation
- Larger studies need to be conducted to evaluate the total impact of ASV on morbidity and mortality.